REMARKS

Applicant would like to thank the Examiner for the thorough review of the present application. As discussed in detail below, the present claims include recitations that patentably distinguish the claimed invention over the cited references, taken individually or in combination. Based upon the following remarks, Applicant respectfully requests reconsideration of the present application and allowance of the pending claims.

Amendments to the Claims

Claims 9 –13 are currently pending in the present application.

Claims 1-8 were previously cancelled by amendment as of 15 September 2006.

Claim 9 has been amended to further distinguish the claimed invention from the cited 35 U.S.C. § 102(b) reference, United States Patent No. 6,207,369, issued to Wohlstadter et al. (hereinafter, the Wohlstadter patent).

Specification Objections Under 35 U.S.C. § 132(a)

The specification stands objected to under 35 U.S.C. § 132(a) as being amended to include new matter into the disclosure of the invention. The Examiner believes that the amendment filed 15 September 2006 introduced new matter into the disclosure. Specifically, the amendment of Table 1 to define the composition of the signaling DNA as including "FcFc".

Applicant respectfully asserts that the changes made to the specification were to correct typographical errors that occurred during the initial filing of the Korean application and, therefore, do not constitute new matter.

Claim Rejections Under 35 U.S.C. § 102(b)

Claims 9-13 stand rejected under 35 U.S.C. § 102(b) as being anticipated by United States Patent No. 6,207,369, issued to Wohlstadter et al. (the Wohlstadter patent). Applicant respectfully submits that these rejections are overcome by the following arguments and amendments made to claim 9.

The Wohlstadter Patent Does Not Teach or Suggest Detecting Amount and Type of the Target DNA by Measuring a Change of the Electrochemical Signal of the Signaling DNA, *in Terms of Current Between the Electrodes.*

Independent claim 9 of the present invention, as currently amended, requires the step of detecting amount and type of the target DNA by measuring a change of the electrochemical signal of the signaling DNA, *in terms of current between the electrodes,* before and after the competitive reaction" (emphasis added). Thus, in the present invention, the amount and type of target DNA is detected by measuring the amount of current between the electrodes before after the competitive reaction and comparing the differences between the amount of current to determine the amount and type of target DNA.

The Wohlstadter patent does not teach or suggest detecting the amount and type of the target DNA by measuring the current between the electrodes. The Wohlstadter patent is limited to a method for detecting the amount and type of target DNA by measuring luminescence generated when the sample is excited. See for example, column 57, lines 30 – 37, which describe the method of the Wohlstadter patent as, "The method includes the steps of (a) forming the complex; (be) collecting the complex by filtration on a porous, conductive electrode; (c) inducing the label compound in the collected complex to luminescent by imposing a voltage on the electrode; and (d) detecting the emitted luminescence from the electrode." In addition, the method of the Wohlstadter patent also discloses at column 69, lines 41-53, "Alternatively, the method includes (a) contacting a sample containing a plurality of analytes of interest and a label compound capable of electrochemiluminescence with a plurality of electrode zones, each of which comprises a fibril mat containing a domain containing a reagent capable of binding a component of an electrochemiluminescence assay; (b) inducing the label compound collected on said fibril mats to electrochemiluminescence; and (c) measuring the emitted luminescence."

Therefore, since the Wohlstadter patent does not teach or suggest detecting the amount and type of the target DNA by measuring the current between the electrodes but instead is limited to a teaching of detecting the amount of target DNA by measuring the luminescence generated when a sample is excited, the present invention, specifically independent claim 9, is clearly distinguishable for the Wohlstadter patent.

The Wohlstadter Patent Does Not Teach or Suggest Preparing a Chip for Detecting DNA, Wherein the *Complementarity Between Base Sequences of the Signaling DNA and the Target DNA is Higher than Between Base Sequences of the Probe DNA and the Signaling DNA*

Independent claim 9 of the present invention, as currently amended, requires the step of "preparing a chip for DNA detection....wherein the *complementarity between base sequences of the signaling DNA and the target DNA is higher than between base sequences of the probe DNA and the signaling DNA...*" (*emphasis* added). Support for this claim amendment is provided for in the present specification at paragraphs [0022], [0041] and [0066]. Thus, as shown in Fig. 2B of the present application, and described at paragraph [0066], "when complementarity of the base sequence of the signaling DNA 23 to the base sequence of the target DNA 24 is designed as higher than that of the base sequence of the signaling DNA 23 to the base sequence of the probe DNA 22, and the signaling DNA 23 is subject to hybridization to form a double strand with the target DNA 24 instead of the probe DNA 22 after competitive reaction to form a double strand, so that the double strand of the target DNA 24 and the signaling DNA 23 is separated from the electrode surface into the solution."

The Wohlstadter patent does not teach or suggest preparing a chip for DNA detection, wherein the complementarity between base sequences of the signaling DNA and the target DNA is higher than between base sequences of the probe DNA and the signaling DNA. In this regard, the Wohlstadter patent does not teach such complementarity that results in a double strand of the target DNA and the signaling DNA being separated from the electrode surface into the solution after competitive reaction.

Therefore, since the Wohlstadter does not teach or suggest preparing a chip for DNA detection wherein the complementarity between base sequences of the signaling DNA and the target DNA is higher than between base sequences of the probe DNA and the signaling DNA, as such, independent claim 9 is further distinguishable form the Wohlstadter patent.

The Wohlstadter Patent Does Not Teach or Suggest Detecting Amount and Type of the Target DNA by Measuring A Change of the Electromechanical Signal of the Signaling DNA *Before and After the Competitive Reaction*

Claim 9 of the present invention requires the step of, "detecting an amount and type of the target DNA by measuring a change of the electromechanical signal of the signaling in terms of current between the electrodes DNA *before and after* the competitive reaction" (emphasis added).

The Wohlstadter patent does not teach detecting the amount and type of target DNA by measuring a change of the electrochemical signal *before and after* the competitive reaction. Referring to Column 89, lines 58-61, the Wohlstadter patent only measures the electroluminescence after the assay/reaction and compares it to "binding domains for internal standards included in the sample solution."

Therefore, since the Wohlstadter patent is limited to a teaching of measuring the electromechanical signal after the competitive reaction and comparing it to binding domains for internal standards in the sample solution, the Wohlstadter patent does not teach or suggest measuring of the target DNA *before* the competitive reaction and, as such, independent claim 9 is further distinguishable form the Wohlstadter patent.

The Wohlstadter Patent Does Not Teach or Suggest Preparing a Chip for Detecting DNA, where a Double Strand Formed by Hybridization of Signaling DNA and Probe DNA is Fixed to the Electrodes

Claim 9 specifically requires that a double strand consisting of both a signaling DNA and probe DNA be fixed to the electrode during the preparation step.

In the Final Office Action, the Examiner believes that the Wohlstadter patent teaches preparing a chip by fixing a double strand that includes both signaling DNA and probe DNA to an electrode. Specifically, the Examiner relies on Column 48, lines 30-34 of the Wohlstadter patent:

> The presence of the analyte in the sample will reduce the amount of competing ECL-labeled ligand that binds to the binding domain, *thus reducing (relative to when no analyte is present in the sample) the resulting amount of ECL*. ECL in the resulting binding domain is triggered and the amount of light emitted is quantitatively determined, thereby quantitatively determining the amount of the analyte of interest present in the sample. (Emphasis added)

The Examiner reasons that this teaches that the signal is reduced upon analyte binding and, thus, demonstrates that a signal from the ECL-labeled ligand is detected in the absence of the sample analyte and prior to competitive binding of the sample analyte. Examiner additionally states that the quantity of reduced signal could only be determined if a signal was detected and measured prior to addition of the sample ligand. The Examiner further reasons that this makes it clear that Wohlstadter teaches preparing the substrate having a hybridized capture probe and signaling probe.

Applicant respectfully disagrees with the Examiner's interpretation of the teachings of the Wohlstadter patent. The Applicant believes that the Wohlstadter patent is limited to a teaching of preparing the electrode by fixing probe DNA to the electrode.

Specifically, at Column 89, line 42, the Wohlstadter patent teaches, "A capillary array containing mixtures of acrylamide, bis-acrylamide, N-acryloylsuccinimide, azo-bis-cyanovaleric acid, and nucleic acid probes functionalized with amino groups is then brought into contact with the aligned surface." The Wohlstadter patent further teaches that "the probe DNA hybridizes to signaling DNA" during the assay/reaction step (Col. 89, lines 49-61), which occurs after the electrode preparation step.

Accordingly, Applicant respectfully requests reconsideration and withdrawal of the rejections of Claim 9. Claims 10-13 are believed allowable for at least the same reasons as presented above with respect to Claim 9 by virtue of their dependence from Claims 9.

Conclusion

Therefore, all objections and rejections having been addressed, it is respectfully submitted that the present application is in condition for allowance and a Notice to that effect is earnestly solicited. Should any questions remain unresolved, the Examiner is encouraged to contact the undersigned attorney for Applicants at the telephone number indicated below in order to expeditiously resolve any remaining issues.

To the extent necessary, a petition for an extension of time under 37 C.F.R. 1.136 is hereby made. Please charge any shortage in fees due in connection with the filing of this paper, including extension of time fees, to Deposit Account 07-1337 and please credit any excess fees to such deposit account.

Respectfully submitted,

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